Claims

What is claimed is:

1. An optical concentrator for concentrating light from a moving light source comprising:

a) a substantially transparent sheet made from a material having a substantially constant refractive index;

b) wherein said substantially transparent sheet has a series of grooves formed in a face, said series of grooves defining a groove array;

c) wherein said groove array is filled with a layer of substantially transparent material having an electrically changeable refractive index when an electromagnetic field is applied thereto, said layer of substantially transparent material being defined as an active layer;

d) a means for applying an electromagnetic field having a changeable strength to said active layer;

e) a means for controlling the strength of said electromagnetic field;

f) an optical condenser, positioned in optical communication with said substantially transparent sheet and said active layer;

g) wherein light from a light source interacts with said substantially transparent sheet and said active layer and said optical condenser such that said light is concentrated in a localized region of space.

2. The optical concentrator of claim 1 further comprising:

a) a plurality of substantially transparent sheets having a plurality of groove arrays;

b) a plurality of active layers.

c) wherein said substantially transparent sheets and said active layers are positioned in optical communication with said optical condenser.

3. The optical concentrator of claim 2 wherein an active layer lies between two conducting layers that are electrically connected to a voltage source for providing an electromagnetic field through said active layer when said voltage source produces a voltage.

4. The optical concentrator of claim 3 wherein said plurality of groove arrays have grooves that are parallel with respect to one another.

5. The optical concentrator of claim 4 wherein an active layer is comprised of a liquid crystal material having a director.

6. The optical concentrator of claim 5 wherein said plurality of active layers has a first group of directors having directors that are parallel with respect to one another, and a second group of directors having directors that are perpendicular with respect to the directors of said first group of directors.

7. The optical concentrator of claim 3 wherein said plurality of groove arrays has a first group of groove arrays having grooves that are parallel with respect to one another, and a second group of groove arrays having grooves that are perpendicular with respect to the grooves in said first group of groove arrays.

8. The optical concentrator of claim 7 wherein an active layer is comprised of a liquid crystal material having a director.

9. The optical concentrator of claim 8 wherein said plurality of active layers has a first group of directors having directors that are parallel with respect to one another, and a second group of directors having directors that are perpendicular with respect to the directors of said first group of directors.

10. The optical concentrator of claim 1 further comprising a reflecting surface positioned in optical communication with said substantially transparent sheet and said active layer and said optical condenser, wherein light from a light source interacts with said substantially transparent sheet and said active layer and said optical condenser and said reflecting surface such that said light is concentrated in a localized region of space.

11. The optical concentrator of claim 10 further comprising:

a) a plurality of substantially transparent sheets having a plurality of groove arrays;

b) a plurality of active layers.

c) wherein said substantially transparent sheets and said active layers are positioned in optical communication with said optical condenser and said reflecting surface.

12. The optical concentrator of claim 11 wherein an active layer lies between two conducting layers that are electrically connected to a voltage source for providing an electromagnetic field through said active layer when said voltage source produces a voltage.

13. The optical concentrator of claim 12 wherein said plurality of groove arrays have grooves that are parallel with respect to one another.

14. The optical concentrator of claim 13 wherein an active layer is comprised of

a liquid crystal material having a director.

15. The optical concentrator of claim 14 wherein said plurality of active layers has a first group of directors having directors that are parallel with respect to one another, and a second group of directors having directors that are perpendicular with respect to the directors of said first group of directors.

16. The optical concentrator of claim 12 wherein said plurality of groove arrays has a first group of groove arrays having grooves that are parallel with respect to one another, and a second group of groove arrays having grooves that are perpendicular with respect to the grooves in said first group of groove arrays.

17. The optical concentrator of claim 16 wherein an active layer is comprised of a liquid crystal material having a director.

18. The optical concentrator of claim 17 wherein said plurality of active layers has a first group of directors having directors that are parallel with respect to one another, and a second group of directors having directors that are perpendicular with respect to the directors of said first group of directors.